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March 23, 2000, Serial No. 60/192,444 filed March 24, 2000, Serial No. 60/192,443 filed March 27, 2000, Serial No. 60/192,441 filed March 27, 2000, Serial No. 60/192,440 filed March 27, 2000, and Serial No. 60/192,442 filed March 27, 2000, Serial No. 60/192,953 filed March 29, 2000, Serial No. 60/192,948 filed March 29, 2000, Serial No. 60/192,949 filed March 29, 2000, all incorporated herein by reference.

## In the Claims

## Please add the following new claims:



- 19. (New) A semitransparent optical detector comprising: a PIN diode having amorphous silicon P and N layers; and an intrinsic I layer of an alloy of silicon and germanium.
- 20. (New) The detector of claim 19 on a transparent substrate.
- (New) The detector of claim 20 wherein the substrate is glass. 21.
- 22. (New) The detector of claim 20 wherein the substrate is a polymer.
- 23. (New) The detector of claim 20 wherein the substrate is silicon which is transparent at a wavelength greater than about 1100 nm.
- 24. (New) The detector of claim 19, wherein the concentration of germanium in the I layer is graded from a relatively low concentration adjacent the P and N layers to a relatively high concentration in the interior of the I layer.
- 25. (New) A method of making a semitransparent optical detector, comprising: providing a transparent substrate; depositing a transparent conductive layer on the substrate; vacuum depositing at an elevated temperature a relatively thin P layer of doped amorphous silicon on the conductive layer;

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providing germanium in a form of a GeH<sub>4</sub> gas component of a chemical vapor deposition gas;

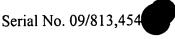
vacuum depositing at an elevated temperature a relatively thick I layer of an amorphous alloy of silicon and germanium using the chemical vapor deposition gas;

vacuum depositing at an elevated temperature a relatively thin N layer of doped amorphous silicon on the conductive layer; and

depositing a transparent conductive layer on the N layer.

- 26. (New) The method of claim 25, further comprising: doping the P layer with boron.
- 27. (New) The method of claim 25, further comprising: doping the N layer with phosphorous.
- 28. (New) The method of claim 25, further comprising:
  bonding the substrate to a vertical cavity surface emitting laser (VCSEL) device.
- 29. (New) The method of claim 25, wherein the substrate is a layer of a vertical cavity surface emitting laser (VCSEL) device.
- 30. (New) The method of claim 25, further comprising: integrating the substrate in a package for a laser device, in a light path of the laser.
- 31. (New) The method of claim 25, further comprising:

varying a concentration of  $GeH_4$  gas in the chemical vapor deposition gas to vary introduction of germanium into the alloy from a relatively low concentration for deposition at a boundary with the P layer, to a high concentration for deposition within the I layer, and to a relatively low concentration for deposition at a boundary with the N layer.



(New) The method of claim 31, wherein the low concentration of GeH<sub>4</sub> gas is about 0% 32. of the chemical vapor deposition gas and the high concentration of GeH<sub>4</sub> gas is selected to optimize photon absorption at a wavelength of interest.

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- (New) The method of claim 31, wherein the low concentration of GeH<sub>4</sub> gas is about 0% 33. of the chemical vapor deposition gas and the high concentration of GeH<sub>4</sub> gas is about 100% of the chemical vapor deposition gas.
- (New) A semitransparent optical detector comprising: 34.
  - a PIN diode; and
- a transparent thin film conductor at least partly covering and contacting a surface of the PIN diode.
- (New) The detector of claim 34, wherein the transparent thin film conductor is ZnO. 35.
- (New) The detector of claim 34, wherein the transparent thin film conductor is SnO. 36.
- (New) The detector of claim 34, wherein the transparent thin film conductor is indium 37. tin oxide.
- (New) The detector of claim 34, further comprising: 38. a substrate on which the transparent thin film conductor is disposed, at least partly between the PIN diode and the substrate.
- (New) A method of making a semitransparent optical detector comprising: 39. providing a transparent substrate; sputtering a transparent thin film conductor onto the substrate; and forming a PIN diode on the transparent thin film conductor and the substrate.
- (New) The method of claim 39, wherein sputtering further comprises: 40. sputtering ZnO.

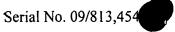
- 41. (New) The method of claim 39, wherein sputtering further comprises: sputtering SnO.
- 42. (New) The method of claim 39, wherein sputtering further comprises sputtering indium tin oxide.
- 43. (New) A semitransparent optical detector comprising: a thin film PIN diode;
- a first transparent conductor at least partly covering and contacting a first surface of the PIN diode;
- a second transparent conductor at least partly covering and contacting a second surface of the PIN diode; and
- a passivation layer covering and enclosing all edges of the PIN diode, defining an aperture on one surface thereof, and exposing a part of the second transparent conductor for contact thereto.
- 44. (New) The detector of claim 43, the passivation layer having a hole defined therethrough, through which contact is made with the second transparent conductor.
- 45. (New) The detector of claim 43, further comprising:
- a patterned metal layer over the passivation layer, including a first conductor entering the aperture to contact the first transparent conductor and a second conductor contacting the second transparent conductor.
- 46. (New) The detector of claim 45, wherein the second conductor contacts the second transparent conductor through a hole defined in the passivation layer.
- 47. (New) The detector of claim 43, wherein the first transparent conductor extends partly over the passivation layer, the detector further comprising:



a patterned metal layer over the passivation layer, including a first conductor contacting the first transparent conductor without entering the aperture and a second conductor contacting the second transparent conductor.

- 48. (New) The detector of claim 47, wherein the second conductor contacts the second transparent conductor through a hole defined in the passivation layer.
- 49. (New) The detector of claims 45 or 47, wherein the thin film PIN diode extends to a contact pad position and the first conductor defines a path on the surface of the PIN diode to the contact pad position.
- 50. (New) The detector of claim 49, wherein the a region contacted by at least one of the first and second transparent conductors defines a limited active area less than all of the PIN diode.
- 51. (New) The detector of claims 45 or 47, wherein the PIN diode has tapered edges, a top surface of the PIN diode having a smaller area than a bottom surface thereof.
- 52. (New) The detector of claim 43, wherein the passivation layer is silicon nitride.
- 53. (New) The detector of claim 43, wherein the passivation layer is silicon dioxide.
- 54. (New) A method of monitoring an optical beam, comprising:
  interposing a transparent photodetector in the optical beam between a light source and a light receiver; and
  - measuring an output of the photodetector.
- 55. (New) The method of claim 54, further comprising: controlling the light source responsive to the measured output of the photodetector.
- 56. (New) A small aperture semitransparent optical detector, comprising, in the order stated:

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a first conductive layer;

a PIN diode having a first edge partially overlying the first conductive layer;

a passivation layer covering and enclosing all edges of the PIN diode and defining an aperture on a surface of the PIN diode; and

a second conductive layer contacting the surface of the PIN diode through the aperture.

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(New) The detector of claim 56, wherein the second conductive layer is a transparent 57. conductor covering the aperture, the detector further comprising:

a third conductive layer contacting the transparent conductor outside the aperture.

- 58. (New) The detector of claim 56, wherein the second conductive layer contacts the surface of the PIN diode near a second edge diagonally opposite the first edge.
- 59. (New) A connection system for a semitransparent optical detector having an aperture, comprising:

a bottom conductor which, in plan view, substantially surrounds the top conductor; a top conductor which surrounds the aperture and defines a hole therethrough aligned with the aperture; and

a bottom conductor which surrounds the aperture and defines a hole therethrough aligned with the aperture.

- 60. (New) The detector of claim 59, wherein the bottom conductor, in plan view, substantially surrounds the top conductor.
- 61. (New) A method of making a small aperture semitransparent optical detector on a substrate, comprising:

depositing and patterning a PIN diode on the substrate;

depositing and patterning a passivating layer covering and enclosing all edges of the PIN diode and defining an aperture on a surface of the PIN diode; and

depositing and patterning a first conductive layer.